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ABSTRACT

A method was developed for identifying students who may be at high risk for failing the State Board Licensing Examination (SBE) for registered nurses. The subjects used in developing prediction equations included 50 students who graduated from the nursing program at Saint Joseph's College (SJC) in North Windham (Maine) during the years 1983-84. The validation group included 105 students who graduated from the nursing program at SJC during the years 1985-88. Subjects were predominately single, white, females in their early twenties. The SBE score was the outcome variable. Predictor variables included subjects' Scholastic Aptitude Test (SAT) scores and college course grades in the areas of science, statistics, and nursing theory. Grade point averages were also used. Two standardized tests of nursing content--the National League for Nursing (NLN) test on Nursing of Children and the Mosby Assess Test (MAT)--were administered to the subjects. Prediction equations were developed from a step-wise regression analysis for each of the following periods: pre-admission; end of the freshman, sophomore, and junior years; and the end of the fall semester of the senior year. The verbal SAT score was the best predictor of failure in the freshman year, but it was replaced as the best predictor at the end of the sophomore year by the cumulative average of nursing and science course grades. The MAT was the best predictor in the senior year. The results support the predictive value of comprehensive tests that are similar in style and format to the SBE. Relationships exist between various test scores and SBE performance. It is concluded that pre-admission test scores, such as the verbal SAT, are valuable predictors early in a program. NLN examinations in the content area of maternal-child health are consistent predictors of SBE. (RLC)

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Identifying Students at Risk for Failure on the Licensing Examination for Registered Nurses

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Running Head: IDENTIFYING STUDENTS AT RISK FOR FAILURE

Identifying Students at Risk for Failure
on the Licensing Examination
for Registered Nurses

The failure of a school of nursing to have a high percentage of its graduates pass the state board licensing examination (SBE) at the first sitting carries several implications. If there is a relationship between performance on the examination and the quality of nursing ability, a nursing program cannot claim to have met its objective of graduating qualified practitioners when a high percentage of its graduates fail the exam. The faculty cannot claim adequate student guidance and/or instruction with high failure rates. State accreditation is at risk, some states have set specific acceptable failure rates beyond which accreditation may not be maintained (Sharp, 1984). Competent faculty and students may be difficult to get and retain if there is an atmosphere of fear of failure and low self-esteem. There is the professional, economic and social burden of state board failure for the new graduate (and his/her employer) to endure. For safe practice, for the self-esteem of students, faculty and graduates and for the growth and development of nursing programs of excellence, high failure rates on licensing examinations are unacceptable.

As the pool of applicants to nursing programs has decreased while society's need for nurses has increased, the need to identify students at risk has become more critical. (McKinney, et al, 1988). If a

student is at risk for failing the SBE, it would be desirable to identify this risk as early as possible so that corrective intervention may be initiated.

Academic success in nursing has generally been defined as passing the state board examination (SBE) for registered nurses or as successful completion of an academic program (Dell & Halpin, 1984). Variables used to predict success have tended to fall into three major groups: grade point averages (GPA), standardized test scores and measures of non-academic factors such as expectations, personal values and personality traits. These predictors have been examined at a variety of points during the students' academic career, ranging from pre-admission to time of graduation, for their ability to accurately predict academic success or failure.

A correlation of .585 between state board scores and cumulative college GPA has been reported by Mckinney (1988). In an examination of VSAT, freshman course grades, and GPA for both semesters of the freshman year, Hayes (1981) found the second semester GPA to account for the greatest amount of variance in predicting SBE performance. Dell and Halpin (1984), have also noted that GPA accounts for the greatest portion of the variance in predicting state board results.

In addition to GPA, standardized tests have been examined for their ability to predict state board

performance. Scores of the VSAT are frequently found to correlate well with state board scores and, after GPA, to account for the largest portion of the variance (Dell & Halpin, 1984). McKinney (1988) found a correlation of .610 between VSAT and NCLEX scores. Melcolm, Venn and Bausell (1981) found a mean correlation of .53 between National League for Nursing (NLN) test scores and state board results. They reported NLN achievement tests in the content areas of Maternal Child Health as reliable predictors of SBE results. Breyer (1984) analyzed the ability of the 1982 edition of the Comprehensive Nursing Achievement Test (Form 1982) to predict scores on the NCLEX-RN and found the Pearson product moment correlation between these tests to be .71. McKinney, et al, (1988) found the Mosby Assess Test to display a significant correlation with NCLEX scores at $P < .001$ ($r=.701$).

The use of GPA and/or standardized tests to predict academic outcome often leaves a considerable amount of unexplained variance in state board scores. This has compelled some investigators to examine the relationship between non-academic predictor variables and academic success. For example, a study of baccalaureate nursing students that used the California Psychological Inventory and the Survey of Interpersonal Values did not find these instruments able to account for a significant portion of the variance not already accounted for be academic predictor variables (Hayes, 1981).

Outside the field of nursing, non-academic variables have frequently been used to predict GPA. For example, the construct of expectancy was utilized by Malloch and Michael (1981). Students were asked to list the courses in which they were enrolled and then list the letter grade they expected to receive in each course, an expected GPA was then calculated. Combining expectancy with the measure of academic ability increased the multiple correlation with GPA from .58 to .65. In another study Holahan, Curran and Kelly (1982) asked transfer students to indicate their perceptions on a questionnaire that asked them to: predict their GPA, compare themselves to other transfer students, compare themselves to other non-transfer students and indicate their perceptions on four scales (Academic Preparation, Institutional Climate, Personal Adaptation and University Demands). Results were entered into a correlation with the students' actual GPA (r=.56). A step-wise regression analysis was then done using the expected GPA as the dependent variable. The four student perception scales, along with two social comparison measures, were used as predictor variables. Expectations of university demands correlated .42 with expected GPA and comparison ratings with other transfer students brought the multiple correlation to .47. Additional variables did not improve the correlation significantly.

A relationship can be demonstrated between measures of student achievement and state board

results. The present study is directed at developing a method for identifying students who may be at high risk for failing the SBE. A concept of "at risk' is derived from the continuum of "academic success", which can be evaluated by objective methods. The measure of success selected for the present study is performance on the SBE. IT is assumed that student academic success is primarily determined by three factors: intrinsic attributes (eg, intellectual ability and motivation), content and quality of teaching, and accurate student performance feedback. These factors will be reflected (at least in part) in aptitude, achievement, and personality testing. Predicting students performance on the SBE and especially identifying and analyzing those students "at risk", will allow steps to be taken to improve course content, to better evaluate learning, and to provide remedial counseling.

Method

Subjects

The subjects included in the study to develop prediction equations were 50 students who graduated from the nursing program at Saint Joseph's College, North Windham, Maine, during the years 1983-1984. The validation group was comprised of 105 students who graduated from the nursing program during the years 1985-1988. Subjects were predominately single, white, females in their early twenties.

Outcome Variable

State board score was the outcome variable.

Predictor Variables

Predictor variables included the SAT scores and college course grades which included science, statistics, and nursing theory course grades. GPA's were also used and included the cumulative GPA of all courses at the time of graduation and a cumulative GPA of the nursing and science course grades semester by semester. Two standardized tests of nursing content, the NLN examination Nursing of Children, and the Mosby Assess Test, were also utilized.

Order of occurrence of predictor variables in educational process

Preadmission: VSAT, MSAT

Freshman: Chemistry 1 and 2, Nursing History, Nutrition, Biology, Avefr (a cumulative average of science and nursing courses).

Sophomore: Concepts of Health and Illness, Applied Concepts of Health and Illness, Anatomy and Physiology 1 and 2, Microbiology, Aveso (a cumulative average of science and nursing courses).

Junior: Statistics, Nursing of the Childbearing Family, Process of Family Nursing, Mental-Health Nursing, Nursing of the Childrearing Family, NLN examination Nursing of Children; Aveju (a cumulative average of science and nursing courses).

Senior: Nursing of the Adult, Research, Avefsr (a cumulative average of science and nursing courses),

Nursing of the Community, Integrated Concepts of Health and Illness, Mosby Assess Test, GPA (a cumulative GPA of all courses taken in college).

Analytical Procedures

Step-wise regression analysis, using the .05 level of significance as the entrance criterion was utilized to identify and rank the variables explaining the largest amount of variance in state board scores. Analyses were performed for the end of the freshman, sophomore, and junior years, for the end of the fall semester senior year, and for the send of the spring semester senior year. The variable list was cumulative, i.e., analyses for each year included variables from previous years as well as those for the year being examined. Prediction equations were developed from the step-wise regression analysis for each of the following periods: preadmission, end of the freshman, sophomore, and junior years and the end of the fall semester senior year. When the VSAT was not included in the equations, it was discovered that course grades tended not to be stable predictors. Because the National League for Nursing Examination, Nursing of Children; the Mosby Assess test and the VSAT all correlated highly with SBE, it was decided to use only standardized test scores rather than teacher made tests as variables in the regression equations for the junior and senior year. The procedure called Enter was used rather than the Step-wise regression analysis,

because Enter forces each variable to enter the regression equation.

Scores of 105 nursingstudents who graduated from 1985 to 1988 were used to validate the prediction equations for the senior year via a Pearson correlation coefficients.

Results

SBE_p = predicted state board exam scores.

SE = standard error

(1983-1984 Graduates, n=50

Preadmission: SBE_p = (1.91)VSAT + 1123 (SE=217) R=.54.

Freshman year: The VSAT entered the equation first (R=.54) and BIO103, Biology, was obtained as a second predictor (R=.60).

SBE_p = (1.54)VSAT + (8.97)BIO103 + 585 (SE=208)

Sophomore year: Aveso, was the first predictor (R=.54) followed by NU204, Applied Concepts of Health and Illness (R=.62).

SBE_p = (18.02)Aveso + (17.4)NU204 - 933.62 (SE=205)

Junior year: SBE_p = (4.06)NLN + (.945)VSAT + 1341 (SE=205) R=.62

Senior year: SBE_p = (5.269) Assess + .545 VSAT + 1438 (SE = 193) R=.67

Validity Test

The correlation between the 105 predicted and actual state board scores was r=.75. Eighty-seven percent of failures were predicted by the equation used

at the end of the fall semester senior year. However, 56% of the group identified as at risk actually passed. The preadmission prediction equation identified 70% of actual failures. Sixty-two percent of those identified as at risk at the time of admission actually passed.

Discussion

The results of this study are consistent with those reported in the literature. Looking at pre-admission standardized test scores in conjunction with measures of achievement in college, when predicting success on SBE, Dell and Halpin (1984) found the grade point average senior year in college to account for the main portion of their variance, with VSAT following. The present study found VSAT to be the best predictor in the freshman year, but it was replaced as the best predictor at the end of the sophomore year by the cumulative average of nursing and science course grades.

Melcolm, Venn and Bausell (1981) identified the NLN examination in Maternal Child Health as reliable predictors of SBE results. In the present study, the correlation between the NLN, Nursing of Children, and SBE was r=.6. The Mosby Assess Tsst was identified as the best predictor in the senior year. The highest single correlation was between the Assess Test and SBE (r=.68). Breyer (1984) found a high correlation between the NLN Comprehensive and the NCLEX-RN. McKinney, et al (1988) found the correlation between the Mosby Assess Test and NCLEX to be 0.701. Jenks et

al (1989) found it to be .73. These results support the predictive value of comprehensive tests that are similar in style and format to the NCLEX-RN.

Accuracy in predicting failure is good at the time of pre-admission , and at the end of the fall semester senior year. Once the VSAT is dropped from the prediction equation, predictions become poorer. The courses that replace the VSAT in the equations appear to be too idiosyncratic across classes to be reliable predictors. Prediction equations were derived for the junior and senior years based on students' standardized test performance. The amount of variance accounted for by using one standardized test was very close to that obtained when course grades were included in the variable list. Using course grades, in the junior year R=.68 and in the senior year R-.72. Using only standardized test score, R=.62 in the junior year and .67 in the senior year. The prediction equations became much more accurate when the standardized test scores were used.

The Assess Test is given in December. Test results have been used to assist students to prepare for the SBE. Students who have had low VSAT and low Assess Test scores have received the most intensive support. Actual State Board failures have been much lower than predicted State Board failures. Eighty-seven percent of the actual failures were identified by the senior predictor equation. 56% of those predicted at risk actually passed. Because of

the SBE Review, it is not surprising that there are more predicted than actual failures.

The prediction equations for the freshman, sophomore and junior years have not yet been validated. Jenks, et al (1989) note that predictions made in the senior year, although accurate, tend to be too late to be most helpful.

Prediction equations at the time of preadmission while identifying 70% of the actual SBE failures, also have 62% of the "at risk" group go on to actually pass the SBE.

Conclusion

There appears to be relationships between a variety of test scores and SBE performance. Pre-admission test scores such as VSAT are valuable predictors early in a program. NLN examinations in the content area of maternal-child health have been cited by the literature and supported in this study as being consistent predictors of SBE. The standardized comprehensive nursing exams similar in style and format to the SBE, e.g. Mosby Assess Test, appear to have high correlations with the SBE.

Students and faculty can evaluate student performance on the basis of predicted state board scores calculated at different points in the student's career. Identifying student who are "at risk", on the basis of a predicted state board score, is an evaluative procedure upon which needed remedial actions can be based.

Further study needs to be done to validate the freshman, sophomore and junior rediction equations. Control groups need to be developed. Research should be done to determine whether or not using a category of "at risk" as identified by the pre-admission prediction equations as a basis for offering special guidance to students is an effective and efficient strategy to increase academic success.

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